



(9/21/06-III)

Program

## **2006 Wind Turbine Reliability Workshop**

8:30 AM Tuesday, October 3 to 4:00 PM Wednesday, October 4, 2006

At

**Albuquerque Marriott Pyramid North**

5151 San Francisco Road NE  
Albuquerque, NM 87109 USA

Hosted by:

**Sandia National Laboratories**

In association with:

**National Renewable Energy Laboratory (NREL)**  
**American Wind Energy Association (AWEA)**

The purpose of this workshop is to define the main wind turbine reliability issues and their potential cost impacts as well as planning for characterizing and reducing O&M costs. Stakeholder perspectives should address difficult questions, such as:

- What are the most pressing reliability and O&M issues?
- What can be done to make improvements?
- Demonstration of reliability comes with time, but what predictive tools are effective when paired with the performance and reliability information we now possess?
- What tools are effective in managing failures and faults?
- What stakeholder feedback to the design teams would most likely result in progressive changes in advanced turbine designs?

## Tuesday, October 3

### *Registration and Continental Breakfast at 7:30*

#### **Why are we here?**

**8:30am**

To determine if a collaboration can be formed between researchers, designers, maintenance managers, owners, manufacturers and other industry stakeholders in the area of improving reliability functions, process, and products with a goal toward understanding and reducing O&M costs.

- *Welcome and Purpose of the Workshop*, Roger Hill, Sandia
- *Research and Development Roles*, Sandy Butterfield, NREL
- *Benchmarking Reliability and Industry Activities*, Thomas Jonnson, AWEA O&M Working Group Chairman

#### **Managing Costs of Unreliability**

**9:00am**

*(Roger Hill moderator)*

A cross section of reliability stakeholders will discuss how much could be saved through increased reliability, reduced failures, improved performance, and improved site specific designs. Speakers will also discuss typical challenges of O&M today

- *Managing Wind Turbine Generation O&M Costs Through Failure Prediction and Proactive Maintenance*, Mike Smith, enXco
- *Reliability and Implications in the Proforma*, Bill Vachon, WA Vachon and Assoc.
- *An Owner's Perspective*, Neal Emmerton, Babcock & Brown
- *Reliability Case Study—Tools and Results*, David Robinson, Sandia
- *Discussion*

**10:15**

***Break***

#### **Perspectives for Reliability Improvements**

**10:45am**

*(Thomas Jonnson moderator)*

Manufacturers are faced with an exponentially growing sales demand. With a wide variety of product and services, the market is expected to have continued growth. Invited speakers will provide information on how risks are managed and how high reliability and service needs are addressed.

- *Wind Turbine Reliability and Service Improvements*, Ben Bell, Bell Windpower
- *North American Wind Research and Training Center*, Dr. Phillip O. Barry, Mesalands Community College

Other confirmed speaker: Mark Cookson, Vestas

**12:00**

***Lunch***

## **Gearbox and Turbine Lubrication**

**1:00pm**

*(Walt Musial moderator)*

Gearbox failures have been a major source of uncertainty in planning and managing O&M costs. This session will discuss what has been done to help improve designs, manage existing systems and what should be done in the future to improve reliability and reduce the costs of maintaining gearboxes. Speakers in this session will discuss improvements in design requirements, lubrication monitoring, vibration, acoustic sensors, thermal monitoring, and the extent to which condition monitoring can be used as a failure prediction tool and other related topics.

- *Plans for Gearbox Reliability Collaborative*, Walt Musial, NREL
- *Gearbox Repair Experiences*, Thomas Jonnson, Moventas
- *Lubrication...How's That Working For You?*, Brian O'Connor, Lubrizol Corp
- *Extended Discussion*

**2:45**

***Break***

## **Controls, Power Electronics and Generator**

**3:15pm**

*(Sandy Butterfield moderator)*

This session will address operational issues with electrical systems, advanced controls, site specific designs, reliability optimization through site specific management, VAR control, plant performance optimization, design feedback. The following topics will be represented:

- *Conclusions from NREL Condition Monitoring Workshop*, Sandy Butterfield, NREL
- *Generator and Other Electrical Reliability Issues*, Hal Romanowitz, Oak Creek Energy Systems Inc
- *How Intelligent SCADA Design Can Help Improve Reliability and O&M*, Joe Pasquariello, Fenway Systems
- *Power Electronics Reliability Issues—Generator, Inverters and Switchgear*, Bill Erdman, BEW Engineering, Inc
- *Discussion*

**5:00**

***Adjourn***

## Wednesday, October 4

*Registration and Continental Breakfast at 7:00*

### Reliability Review

8:00am

- *Yesterday's Recap—Review of Key Points*, Roger Hill, Sandia
- *The Link Between Onshore Reliability and Offshore Systems*, Walt Musial, NREL
- *Simple Reliability Analysis Techniques—A Short Tutorial*, David Robinson, Sandia

### Blades: Larger and Lighter, How Reliable? (Tom Ashwill moderator)

8:45am

Blades convert the energy of the wind to mechanical energy and the trend has been toward larger systems and a design emphasis on reducing weight. The discussion will focus on the trends and experiences with this component.

- *Blade Issues, Innovations, and Reliability*, Tom Ashwill, Sandia
- *Lightning and Other Environmental Effects on Blades*, Brian McNiff, McNiff Light Industry
- *Economic Benefits of Scheduled Rotor Maintenance*, Gary Kanaby, Knight and Carver
- *Discussion*

10:00

*Break*

### Pitch Systems

10:30am

(Ed Hahlbeck moderator)

The mechanical systems for pitch control of the blade experience loads and are instrumental in the performance of the turbine. This session will discuss what the field experiences have been and what should be done in the future to improve reliability.

- *Overview of Pitch Systems and Reliability*, Ed Hahlbeck, Powertrain Engineers Inc.
- *Factors Influencing Wind Turbine Reliability in Pitch System Designs*, Paul Rowan, MLS Electrosystem
- *Centralized Lubricating Systems Increase Wind Turbine Reliability and Maintainability*, Brian Richards, SKF Vogel
- *Discussion*

### Reduced Turbine Costs in the Life Cycle

11:30am

(Chris Walford moderator)

The speakers will discuss how much could be saved through increased reliability, reduced failures, improved performance, and improved site specific designs. Speakers will also discuss typical challenges of O&M today.

- *O&M Cost Model Assumes Levels of Repairs and Replacements*, Chris Walford, Global Energy Concepts
- *Cranes Are an Important Factor in Availability, O&M costs, and Energy Production*, Bill Vachon, WA Vachon and Associates

12:15

**Lunch**

**Reduced Turbine Costs in the Life Cycle (continued) 1:00pm**  
*(Chris Walford moderator)*

- *Design for Maintenance*, Ed Hahlbeck, Powertrain Engineers Inc.
- *Condition Monitoring as a Tool for Reliability/O&M*, Harry Timmerman, SKF
- *Discussion*

**Operators' Remarks 2:00pm**  
*(Ted DeRocher moderator)*

Operators are faced with the difficulty of managing the performance of the turbines and the cost of the operations. Speakers will address these difficulties and this session will end with an operator open discussion to relate main turbine reliability issues and some approaches or need for improvement

- *An Owner's Interest in Reliability*, Mike Kelly, Horizon Wind Energy Inc
- *Improving Wind Farm Performance Using Reliability Centered Maintenance*, Chanda Kapande B9 Energy
- *The Impact of Major Repairs on Managing the Fleet*, Dean Landon, Caithness Operating Company
- *Invited discussion from Operators*

**2:50 Quick Break**

**Forming Partnerships, Sharing Information, 3:00pm**  
**Group Discussion, Wrap-up**

- *Utility Wind Interest Group O&M Users Group Goals and Objectives*, Steve Wotruba, Energy Northwest

*Discussion*

- *AWEA O&M Working Group Goals and Objectives*
- *Protecting Participants Interests, Non Disclosure Agreements*
- *Closing the Feedback Loop*
- *Opportunities, Issues, Concerns, O&M needs, Data Needs, Follow-on*

**4:00 Adjourn**

*Continental breakfasts, lunches, and breaks refreshments are included in registration fee. All topical sessions will have time for discussion and also in the wrap-up. Presentation titles subject to change. See [www.sandia.gov/wind](http://www.sandia.gov/wind) for other information.*